Investigating Social Interaction Patterns with Depression Severity across Different Personality Traits Using Digital Phenotyping

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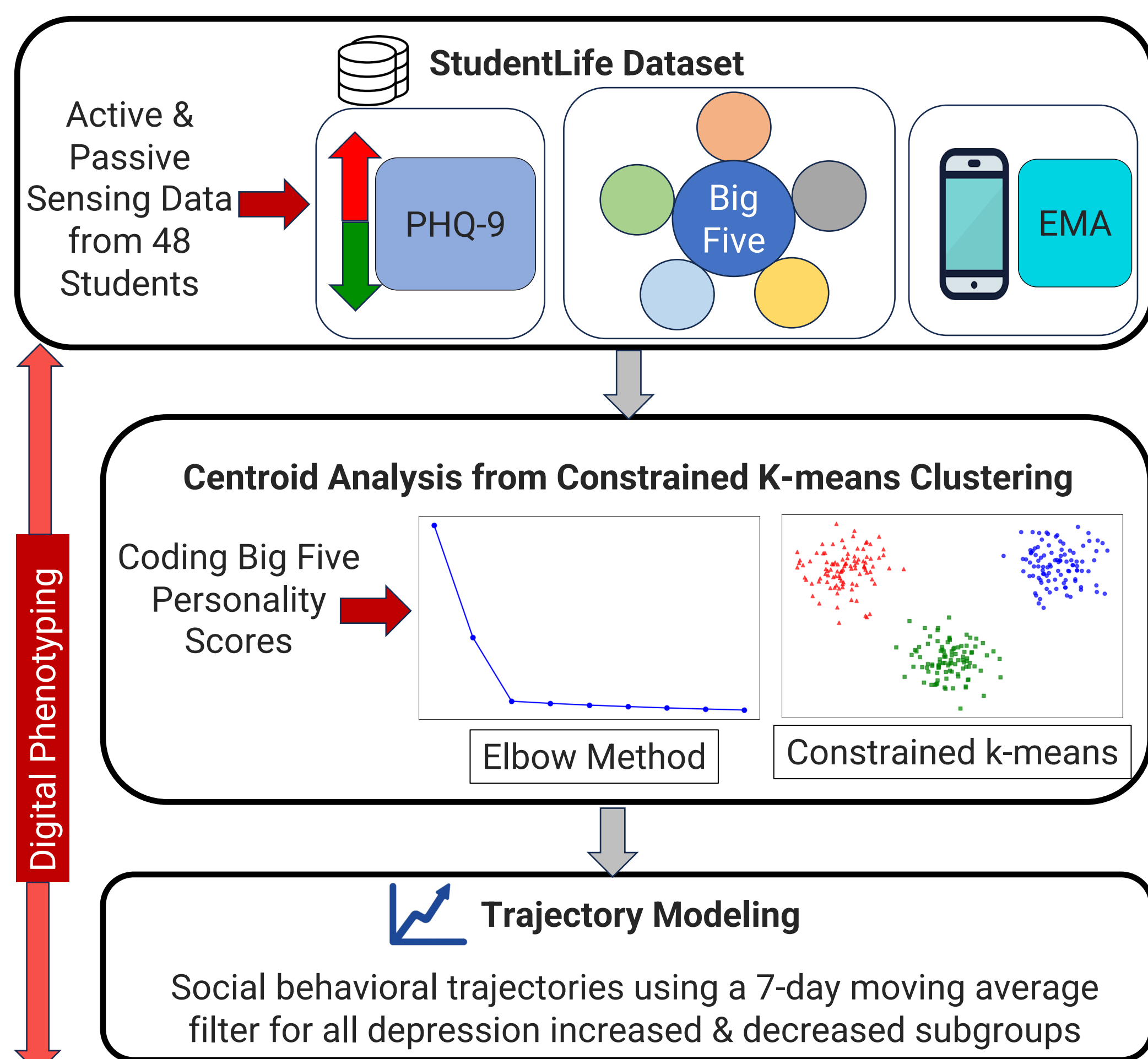THE SATH LAB

ACII at the MIT Media Lab 2023

Motivation

33% of college students experience different mental health disorders, mostly depression

Objective

Investigating the relationship between depression, personality traits, and social interaction patterns among students

Methods

StudentLife Dataset

Active & Passive Sensing Data from 48 Students → PHQ-9 | Big Five | EMA

Digital Phenotyping

Centroid Analysis from Constrained K-means Clustering

Coding Big Five Personality Scores →

Elbow Method | Constrained k-means

Trajectory Modeling

Social behavioral trajectories using a 7-day moving average filter for all depression increased & decreased subgroups
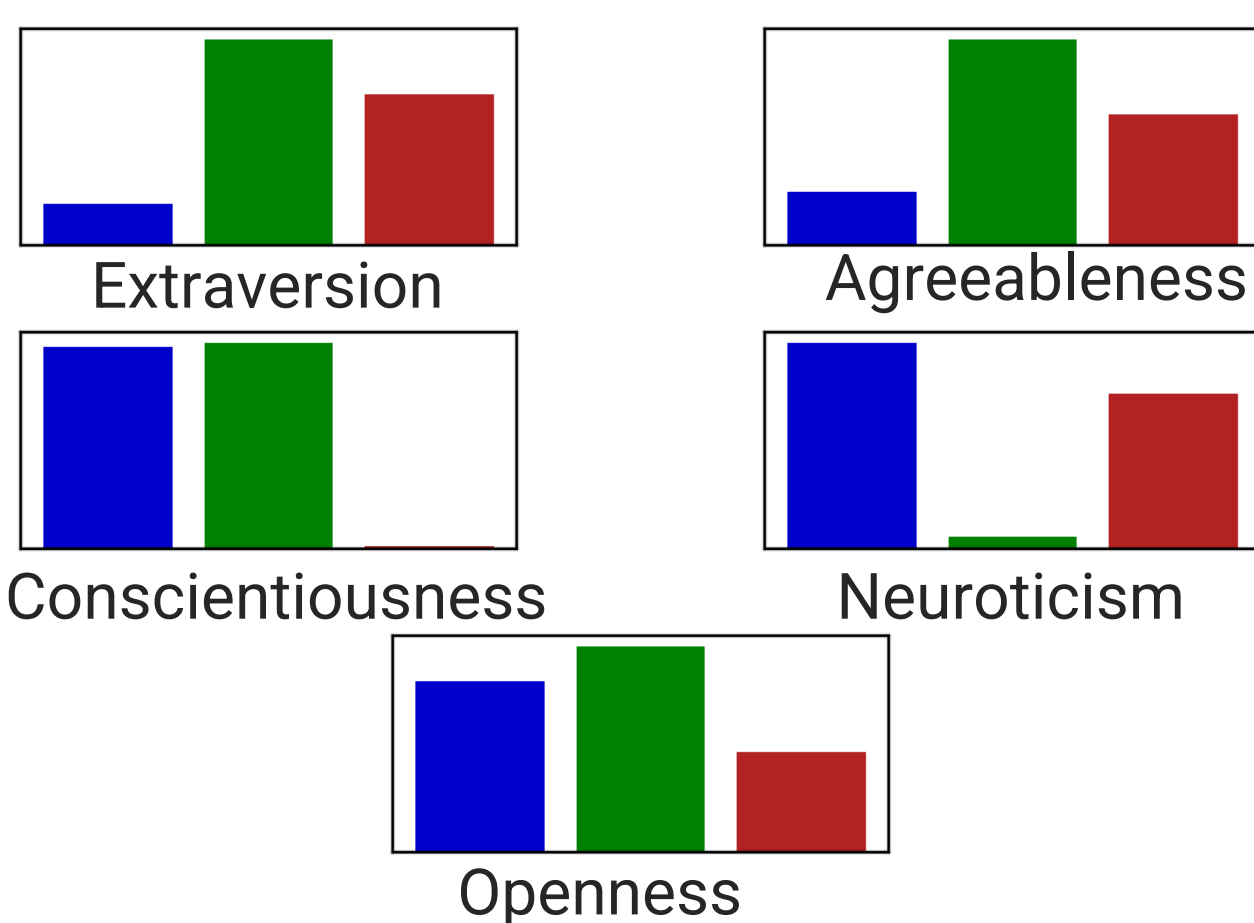
Results

Clustering analysis identifies three distinct personality traits from elbow point 3. Bar plots show between-person means of each clustering variable, big-five scores separately by cluster:

Cluster 1 ■ 16 students - **high neuroticism**

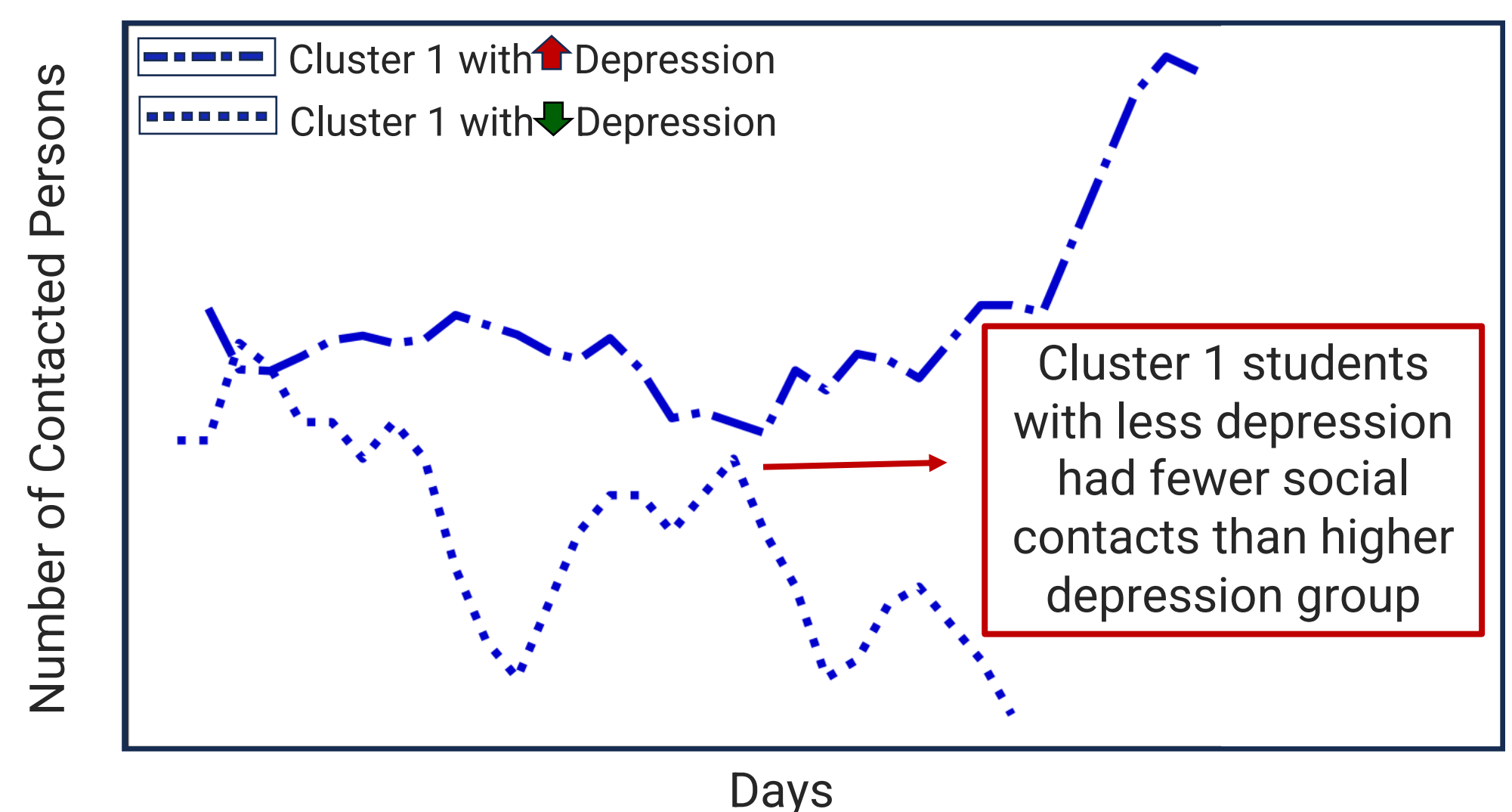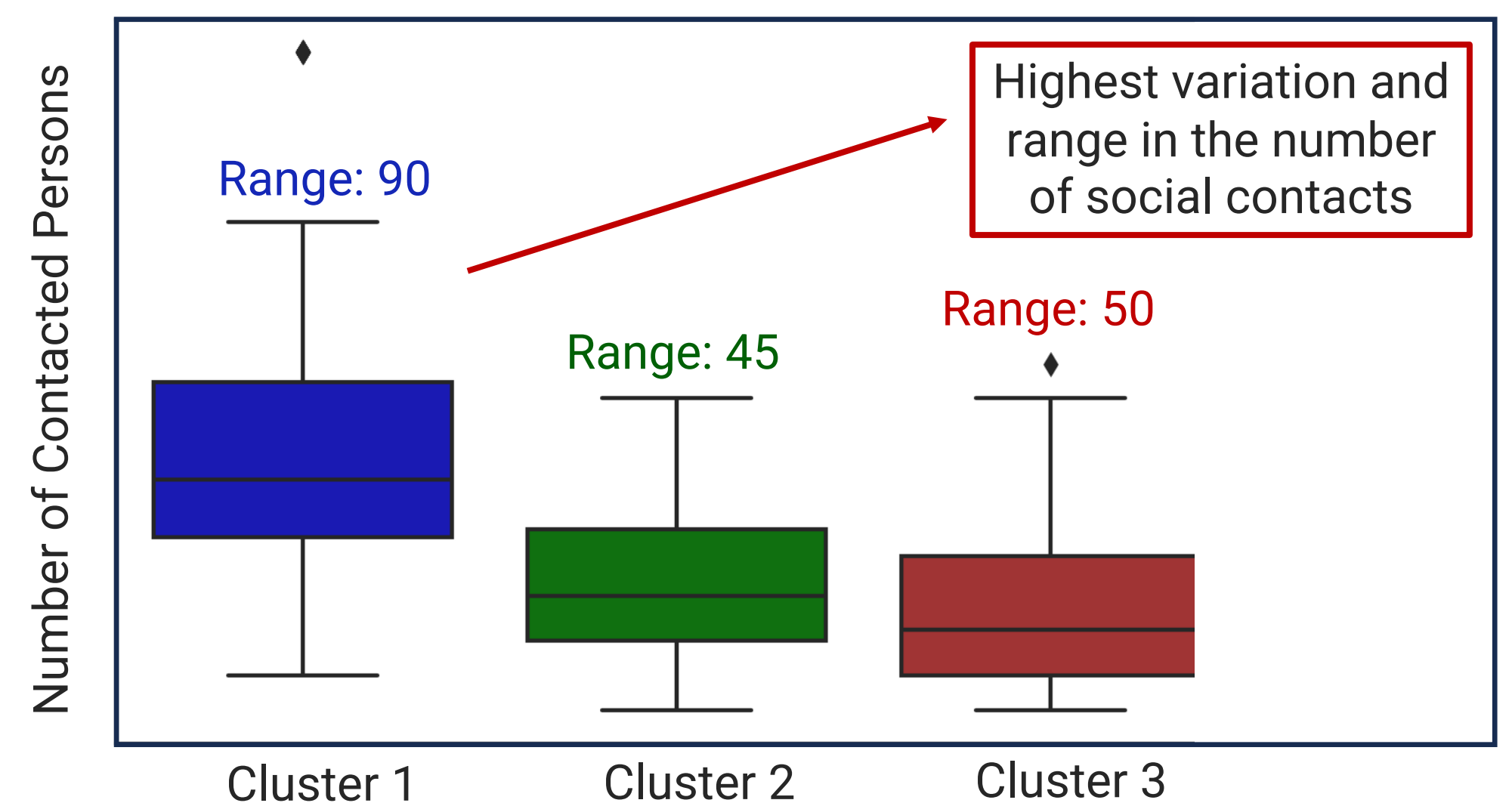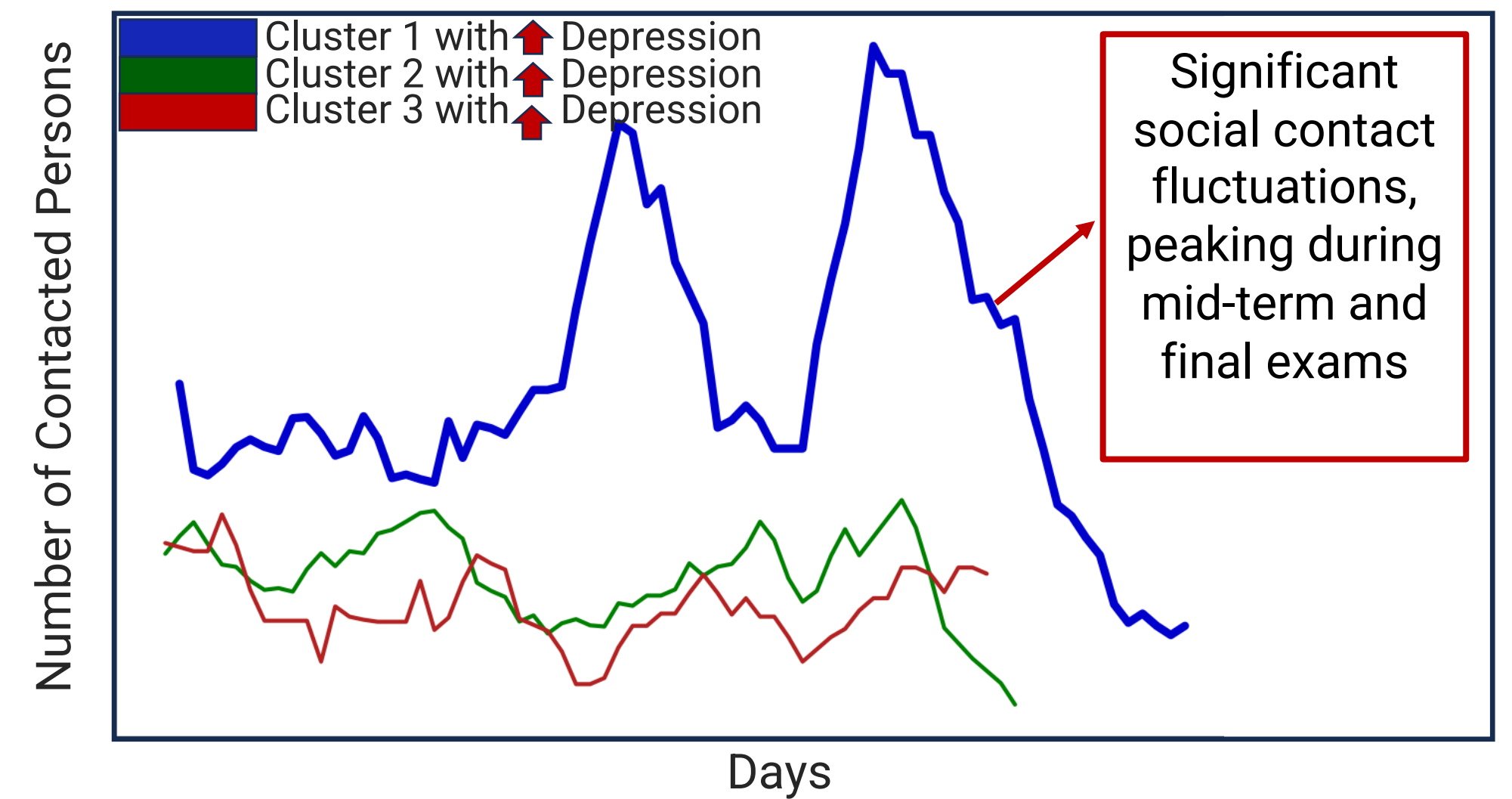Cluster 2 ■ 13 students - **high conscientiousness & low neuroticism**

Cluster 3 ■ 17 students - **low conscientiousness**

Extraversion | Agreeableness

Conscientiousness | Neuroticism

Openness

Cluster 1

Survey Type	Variance in PHQ-9 Scores
pre-survey	17.0625
post-survey	27.9743

Cluster 2

Survey Type	Variance in PHQ-9 Scores
pre-survey	43.2424
post-survey	61.4285

Cluster 3

Survey Type	Variance in PHQ-9 Scores
pre-survey	7.1838
post-survey	9.3166

Key Takeaways

Highly neurotic students with increased depression had more variation in the number of social contacts.

Cluster 1 with ↑ Depression
Cluster 2 with ↑ Depression
Cluster 3 with ↑ Depression

Number of Contacted Persons

Days

Significant social contact fluctuations, peaking during mid-term and final exams

Range: 90

Range: 45

Range: 50

Highest variation and range in the number of social contacts

Number of Contacted Persons

Cluster 1 | Cluster 2 | Cluster 3

Cluster 1 with ↑ Depression
Cluster 1 with ↓ Depression

Number of Contacted Persons

Cluster 1 students with less depression had fewer social contacts than higher depression group

Days

Below table shows more variance, and standard deviation in cluster 1 students' social behavior compared with other two student clusters:

Personality Trait	Variance	Standard Deviation
Cluster 1 Students	**0.685**	**0.828**
Cluster 2 Students	0.405	0.636
Cluster 3 Students	0.441	0.664

Our findings indicate that students with neurotic personality traits who experience depression exacerbation show more variation in their number of social contacts POSSIBLY due to low self esteem and negative self-perception.

Negative Emotion

Self Consciousness

Highly Neurotic Students Characteristics

Self-Doubt & Low Self Esteem

Anger & Irritability

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